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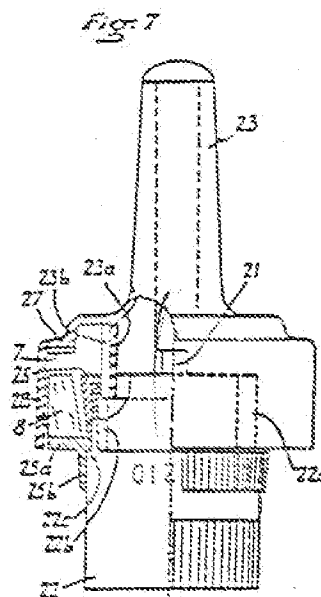
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(54) Dosing vaporizer equipped with counter of administered doses.

(57) Each time push-button (23) is depressed for discharging a product dose, ring (25) advances one step, and the number of doses administered (counter) or the number of doses remained to be administered (discounter) appears at a window.



## DOSING VAPORIZER EQUIPPED WITH COUNTER OF ADMINISTERED DOSES.

The object of the present invention is a dosing vaporizer, eventually adaptable, equipped with a counter of administered doses.

This invention applies to valves called dosing valves, the principle of which uses the pressure of a propelling gas contained in a bottle with the product to be vaporized, as well as to pumps functioning with energy developed by depressing a push-button. The devices comprise a valve rod which protrudes externally from the valve or pump. The rod and the valve (pump) have revolution structure around the rod axis which is hereafter designated as thrust axis.

Particularly, in medical applications, a user has to vaporize (into his/her nostrils, throat, etc...) a certain number of doses, for example daily. In order to avoid errors, and for the purpose to simplify the application, it seems interesting to have a vaporizer equipped with means permitting to display the number of administered doses, or the number remained to be administered, if initially the origin number of doses (counter or discounter) is correctly displayed beforehand.

In the European patent 0.114.617, a dosing valve was proposed, it comprises a counter of the push-button movement. The counter comprises a mobile crown equipped with slanting surfaces against which complementary slanting surfaces being in one piece with the push-button may push on. The descending movement of push-button causes a partial rotation of the crown. The rotation is completed with a complicated, costly and unreliable pawl systems. The object of the present invention is the embodiment of a simple, moderate cost and reliable system.

According to the present invention, this result is obtained with a dosing vaporizer adaptable to a bottle and a valve for discharging doses of vaporized product comprising a valve rod actionable by depressing a push-button along a thrust axis of the valve rod, in which the push-button is guided such that it won't be able to rotate itself around the thrust axis, a crown-shaped piece surrounds the valve rod and defines with one part of the push-button an annular space, characterized by the fact that one of the pieces of push-button and the crown, has at least a stud protruding into the annular space, and the other piece has a series of identical members interfering with the stud, such that for each up-and-down movement of the push-button, the crown advances one fraction of the round around the thrust axis.

The valve may have numbers which can be hidden with a cache, being in one piece with crown A. At each depressing action of the valve rod, the crown rotates an angle

(End of column 1, page 2)

corresponding to the number spacing. The cache let appear a number which indicates the number of administered doses since the zero (counter), or the number of doses remained to be administered, if initially the number of doses remained to be administered is set on the crown (discounter). In this last case, means are provided for blocking the valve operation when the number zero is reached.

Other characteristics and advantages of this invention will appear in the description below, given hereafter as non-limiting example, with regard to attached drawings, and which will help to understand how this invention can be embodied.

In drawings:

Figures 1 to 6 schematically show various modes of application of the present invention;

Figures 7 to 8 show an embodiment of a variation of this invention;

Figures 9 and 10 show an embodiment of another variation of this invention.

In Figure 1, internal cylindrical surface 1 of crown 2 is shown, surrounding the valve, and a piece 3 being in one piece with the valve and accompanied it in its up-and-down movement along the valve thrust axis. Surface 1 has ribs 4 and 4' extending slantwise in the opposite direction from upper and lower edges of this cylindrical surface, and forming a herring bone pattern. Ribs 4 of the upper series extends over about half of surface 1 height, and ribs 4' of the lower series extends over about half of the surface 1 height. The two series of ribs are staggered from each other. A stud 5, in one piece with piece 3, protrudes from it, and extends toward surface 1. One part of surface 1 having ribs 4 and 4' is schematically shown in perspective in Figure 2a, and piece 3 with stud 5 is schematically shown in perspective in Figure 2b.

Operating principle of the device is schematically explained in Figure 1. Initially, stud 5 is at position A. When the user activates the vaporizer, he/she depresses the push-

button, and the stud descends first to position B. There it meets the slanting surface of rib 4'. Continuation of the descending movement of the stud pushes rib 4' to the left of the figure until the end of the pushing action, and the stud arrives to position C. In Figure 1, position C isn't shown on the same vertical line with positions A and B because crown 2 is supposed to be rotated. To simplify the graphic representation, stud 5 is supposed to rotate toward the right, while in the reality, it always remains on the same vertical path, and it was crown 2 turning, i.e. it rotates around the thrust axis. Advantageously, the crown is mounted with soft friction to avoid undesired rotation.

(End of column 2, page 2)

When depressing action ceases, and after a dose of product being expelled by the vaporizer, the stud, along with the valve and the push-button, climbs back under the effect of pull-back spring, and arrives at position D. There, it meets the inner slant surface of upper rib 4. The continuation of the upward movement of the stud pushes rib 4 to the left of the figure, until the end of its climbing movement and arrives at position E. During the up-and-down movement of the stud, crown 2 rotates a distance A - E. This operation can be repeated. An index, being in one piece with crown 2, moves with regard to a fix index, this fact allows the user to identify the number of administered doses done by the vaporizer. The system may be simply used in continuous rotation, or may be equipped with a stop, for the start and finish of the counter as it will be explained hereafter.

A variation of the embodiment shown in Figure 2a, slanting surfaces on which stud 5 acts on may be formed by teeth 6, one series of which (shown in Figure 3) is placed on inner horizontal radial surface of crown 2, and the other series 6', symmetrical and staggered, on upper horizontal radial surface of crown 2.

In the embodiment which has been described, crown rotation movement corresponding to the up-and-down movement of the push-button, is done in two steps: one step during the descending movement, the other during the climbing movement. In fact, in order for the stud to meet the next lower rib during its next descending movement, and with regard to the crown rotation obtained by the previous descending movement, one has to provide additional rotation so that it will arrive above the next lower rib. Figure 6 shows a

variation of the embodiment where entire rotation movement of the crown is obtained with only one descending movement of the stud. The mobile crown has a series of teeth 7 similar to those in Figure 3 and placed on a horizontal disk, and a stud 8 which moves circularly above this series of teeth 7. Stud 8 is constituted with a supple blade, and is slanting in the desired rotating direction to facilitate its flexion. In rest position, lower edge 8a of stud 8 is slightly placed above teeth 7. When the vaporizer is activated, by depressing the push-button, stud 8 descends, and its point 8a is housed between two teeth 7a, 7b; it is then blocked at the tooth bottom, and continuation of the descending movement causes the stud to flex and pushes tooth 7a to the left of the figure. The length of stud 8 may be selected such that a push on tooth 7a causes the the crown to rotate such that after the climbing movement of stud 8, its extremity 8a is placed above the interval located between the next two teeth 7b, 7c. Distance d between rest position, shown in dotted line, and bottom position, shown in solid line, shows the course of push-button for administering a dose. One will note that the role of teeth 7 and stud 8 are symmetrical: teeth 7 may be in one piece with push-button and stud 8 may be in

(End of column 3, page 3)

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one piece with mobile crown. Here also, the crown is advantageously mounted with soft friction to avoid undesired rotation.

In the variation of Figure 4, ribs 9, 9' are vertical and parallel together. The rotation effect is no longer obtained by the action of a stud against a slanting surface, nor by the flexion of the stud, as shown in Figure 6, but by the action of a spring such as the one in an anchor system. Crown 2 rotation is caused by spring R. At rest, stud 5 (similar to that in Figure 2b), which is at position A, rib 9a rotated with crown 2 by spring R, is stopped by the stud, the result is to prevent the crown from rotating. When the user vaporizes a dose of the product by depressing the push-button, the stud descends from position A, along rib 9a, to position B. As soon as it passes rib 9a, the latter is unblocked and the crown rotates by the spring R action, until the stud is blocked again by lower rib 9'a in C position. The stud descends until it touches the bottom then climbs back under the action of pull-back spring when the user release the push-button. During this climbing movement, rib 9'a is liberated by the stud and the latter will be blocked by upper rib 9b

of pull-back spring when the user release the push-button. During this climbing movement, rib 9'a is liberated by the stud and the latter will be blocked by upper rib 9b until it reaches its D position. The crown has then rotated a distance A - D. Then it is possible to depress the push-button again. It will be noted that roles of ribs 9, 9' and stud 5 are symmetrical: the stud can be in one piece with the crown which is in rotation, and ribs may be carried by a circular piece, the movement of which depends on the movement of the push-button and the valve. Ribs 9, 9' and the stud are made such to produce a sound click each time the stud leaves one rib to be stopped by the other, by the action of spring 130. So, each dose is materialized by two sound clicks which are advantageous for blind users.

In order to make the use of the device much easier and according to this invention, it is interesting to define an origin position for the rotation of the crown, and means to move it to this position.

In Figure 6, and with the device in the rest position, it is noted that lower end 8a of the stud is located above teeth 7. Therefore, in this rest position, the crown may be turned freely. The user may bring the index over a desired fixed index. According to the graduating direction, he/she may bring the index over the number zero, and the index will advance in the direction of ascending numbers, this is the case of a counter. With a reverse graduation, the user may bring the index over the number indicating the number of doses remained to be administered, and after each administered dose, the index advances one step in the direction of descending numbers. The user may see at any time the number of doses remained to be administered.

In the embodiment of Figure 4, in order to be able to turn the crown when the vaporizer is in rest position, a stud 11 will be advantageously used. It is constituted with an elastic blade (Figure 9). In normal operation, the stud presses on ribs 9, 9' with its

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extremity 11a, then there is a blocking. But, if the crown is turned in a direction opposite to spring R force, elastic blade is raised at the passage of blades 9 and the user may then bring the device to a suitable position. A stop 12 is shown in the figure. When, consecutive to a rotation movement, and under the action of spring R, the stud arrives to

position F, it may no longer be turned nor descend. In this case, it can be used as a discounter. The user, from this position F, move the stud, by rotating the crown, as many as ribs 9 as the number of doses to be administered. By doing that, stud 11 passes by deformation above blades 9. When the user has administered the desired number of doses, the stud will be at the F position, and the vaporizer is blocked. If it is desirable to use the device with counter instead of discounter, one has to move the stud to the stop at the other end, and the stop should have enough thickness so that stud 11 could not pass it by elastic deformation. The device may have only one stud, or several studs, distributed at the periphery. In this case, available rotating angle is the quotient of the complete round divided by the number of studs. Stud 11, due to its elasticity, produces a sound click when it falls between ribs 9, 9' after passing one by manual rotation. This profit may be shown in the case of a discounter for helping blind person program the number of doses.

Figure 7 shows a side view with partial cross-sectional view of an embodiment of a device corresponding to the principle described for Figure 6. Valve 21 (valve or pump) may be mounted on any bottle (not shown here) by means of ring 22 which could be screwed on the bottle mouth, or crimped, and maintained in place such that it cannot turn in normal operation ( obviously it is very preferable, but not indispensable according to the present invention which has a rotating crown 25 for the ring 22). A push-button 23, having an adapted form to the product to be vaporized, is installed on the valve. To insure a correct guidance of push-button 23 vis-a-vis the bottle, a skirt 23a extending toward the bottom, and being able to slide in a tubular extension 22a of ring 22. Means are provided to prevent the push-button 23 to turn vis-a-vis ring 22, for instance a rib 23, located at the outside of skirt 23a, cooperating with groove 22b formed in the tubular extension 22a. Push-button comprises an horizontal circular part 27 equipped with teeth 7, corresponding to those of Figure 6, and turned downward. Push-button is finally completed with a peripheral element 28 enveloping the assembly. A crown 25 (Figure 8) is mounted on a shoulder 22c of ring 22. This crown 25 is composed of a plane collar 25a and a skirt 25b. The skirt is attached to the collar at a small distance from the lower edge such to form a shoulder which cooperates with shoulder 22c of ring 22. Skirt 25b is provided for sliding on the upper part of ring 22 and comprised a window 25c

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which has for the purpose to let appear one of the numbers impressed on the top part of ring 22, position references of crown 25 during its rotation, i.e. the number of doses administered, or the number of doses remained to be administered, depending on the graduating direction of numbers. Collar 25a has stud 8 made of supple thin blade slanting in the desired rotating direction. This small thin blade 8 cooperates with teeth 7, as described in Figure 6. A ring 26 is used to maintain in position the crown 25. It is attached to tubular extension 22a of ring 22, the lower part of push-button and crown 25 define annular space 29, inside of which the stud and raised members interacting together. The device operates as it was explained in the description of Figure 6. According to the direction of number order, successive depressions of push-button will cause rotations of the ring which will make ascending or descending numbers appear in the window 25c, depending on the desired choice. In the descending direction, for example, the user will place the number of doses to be administered in window 25c, and for each administered dose, the displayed number comes down one unit. It is possible to have two small thin blades 8 diametrically opposite, or more.

Figures 9 and 10 show perspective view with partial cross-sectional view of an embodiment of a device corresponding to the principle described for Figures 4 and 5. As in the above variation, a valve 21 is mounted on a bottle by means of ring 22. Ring 22 comprises a tubular extension 22a turned upward, and push-button 23 comprises a skirt 23a cooperating with tubing 22a to insure the guidance of push-button 23. For the same manner, a rib 23b on the skirt and a groove 22b in the tubing insure the angular position of push-button 23 vis-a-vis ring 22. A mobile crown 125 (Figures 9 and 10) having a general structure similar to crown 25 and comprising a collar 125a and a skirt 125b, is mounted in rotation on the shoulder of ring 22 and is maintained in place by holding ring 126. Stud 8 is constituted with an elastic blade 11. Peripheral element 128 of push-button 23 comprises on its inner cylindrical wall high ribs 9 and low ribs 9' (or pawls), such as the ones described in Figure 4. A spiral spring 130 wraps around holding ring 126. Extremity 130a is folded back, and is housed in hole 131 of the crown 125. The other extremity is folded back in a similar manner and is engaged into a corresponding hole provided in the holding ring 126. The device operates as it was explained in the description of Figures 4



and 5. As a variation, it is possible to suppress holding ring 126, and the spring can hold the crown 125 in place. Upper extremity of spring is then engaged into a hole provided in the tubular extension 22a of ring 22. There is one piece less in this device, but the assembly is more difficult to do.

(End of column 6, page 4)

## C L A I M S

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1. Vaporizing doser adaptable to a bottle and a valve for discharging doses of vaporized product comprising a valve rod actionable by depressing a push-button along a thrust axis of valve rod, in which push-button (23) is guided such that it cannot turn around thrust axis, and a crown-shaped piece (25, 125) wrapping around valve rod (21) and defines with one part (28, 128) of the push-button, an annular space (29), said piece being mounted such to be able to rotate without being able to move along the thrust axis, characterized by the fact that one of these pieces of the push-button and the crown comprises at least a stud (5, 8, 11) which is protruding into the annular space (29) and the other piece has a series of identical members (4, 4'; 9, 9'; 6, 7) interfering with the stud, such that for each up-and-down movement of the push-button, the crown rotates a fraction of the rotation round around the thrust axis.

2. Device according to claim 1, characterized by the fact that identical members are ribs (4, 4') or teeth (6, 6') placed such to form herring bone pattern, such that in its descending movement, the stud pushes the rib to one side, and that in the climbing movement, it pushes another to the opposite side, to be finally in rest position with a rib adjacent to the previous one.

3. Device according to claim 1, characterized by the fact that identical members are teeth (7), and the stud is a supple blade (8) slanting vis-a-vis the thrust axis and the length of which is such that, vis-a-vis to the amplitude of the descending movement of the push-button, approaching movement of the blade to the teeth, blocks the blade extremity (8a) against one of the teeth making the blade flex such that, laterally, it push the tooth against which it is blocked.

4. Device according to claim 1, characterized by the fact that identical members are parallel ribs (9, 9') placed in herring bone pattern and a spring (130) which makes the stud rotate vis-a-vis the ribs.

5. Device according to claim 4, characterized by the fact that the stud is ~~a~~supple blade (11), one extremity of which is turned in the direction opposite to that caused by the spring in order to pass above the ribs (9, 9') by deformation.

6. Device according to claim 4 or 5, characterized by the fact that a stop (12) is associated with identical members (9, 9') such that, at one position of the stud, the latter is

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blocked in its descending movement as well as in rotation.

7. Device according to claim 1, characterized by the fact that the crown comprises one part having the shape of a collar (25a, 125a) and a cylindrical part (25b, 125b) attached to the collar at a small distance from the inner edge of the latter, the collar having at least a stud (8, 11) having the shape of a supple blade.

8. Device according to claim 7, characterized by the fact that cylindrical part (25b, 125b) and numbers are imprinted on the valve, at the level of said cylindrical part, such that one number appears in window 25c, and that the fraction of the rotation of the crown caused by depressing the push-button, corresponds to the distance between numbers.

9. Device according to claim 4, characterized by the fact that ribs (9, 9') and the stud are made such to produce a sound click each time the stud is released by a rib to be stopped by the other, under the action of spring (130).

10. Device according to claim 5, characterized by the fact that due to its elasticity, the stud (11) produces a sound click when it falls between two ribs (9, 9') after passing one by manual rotation.

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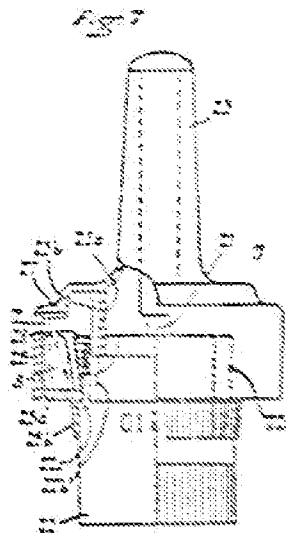
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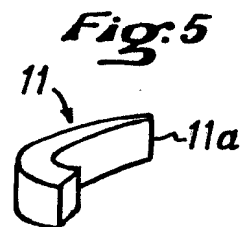
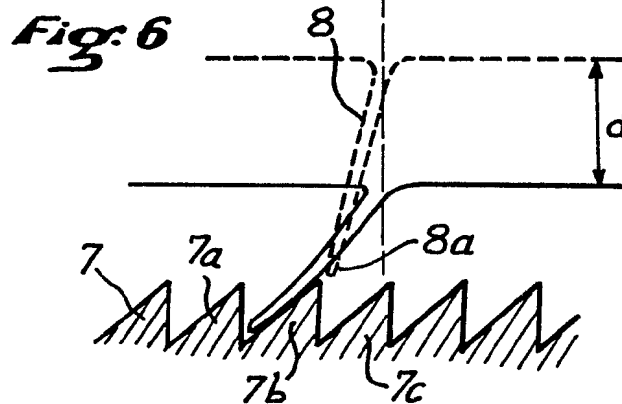
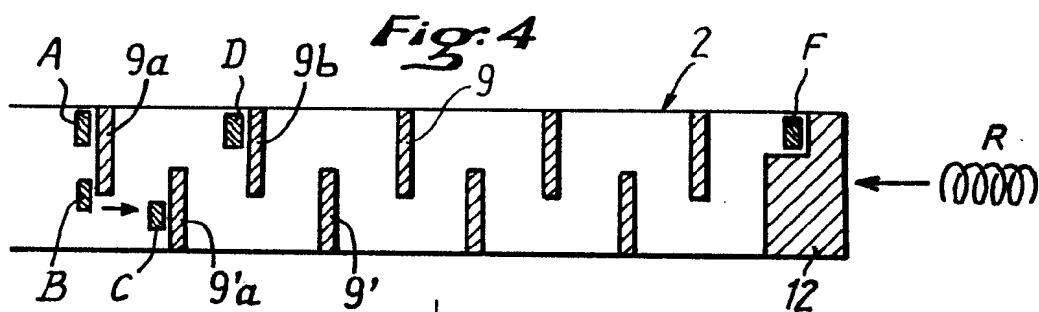
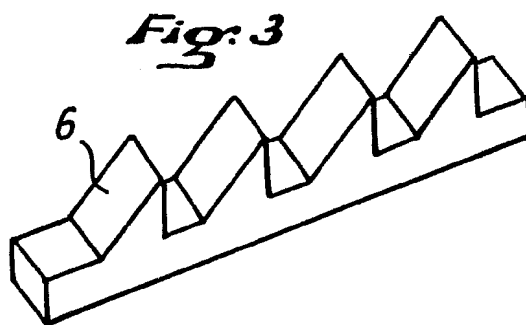
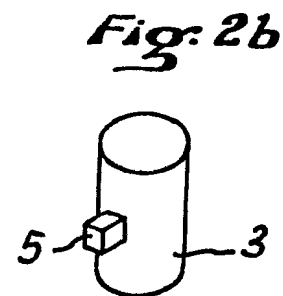
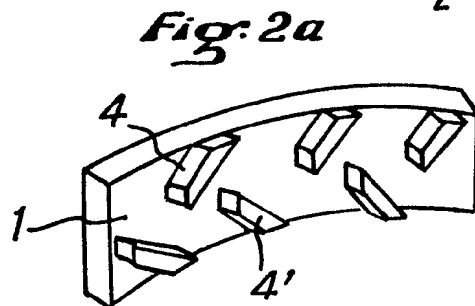
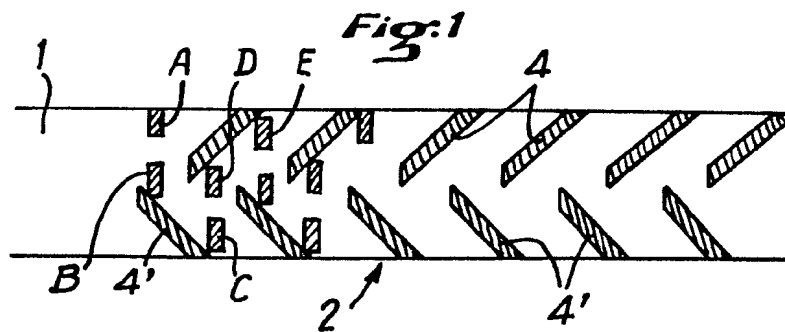


## EUROPEAN RESEARCH REPORT

EP 87 40 2467

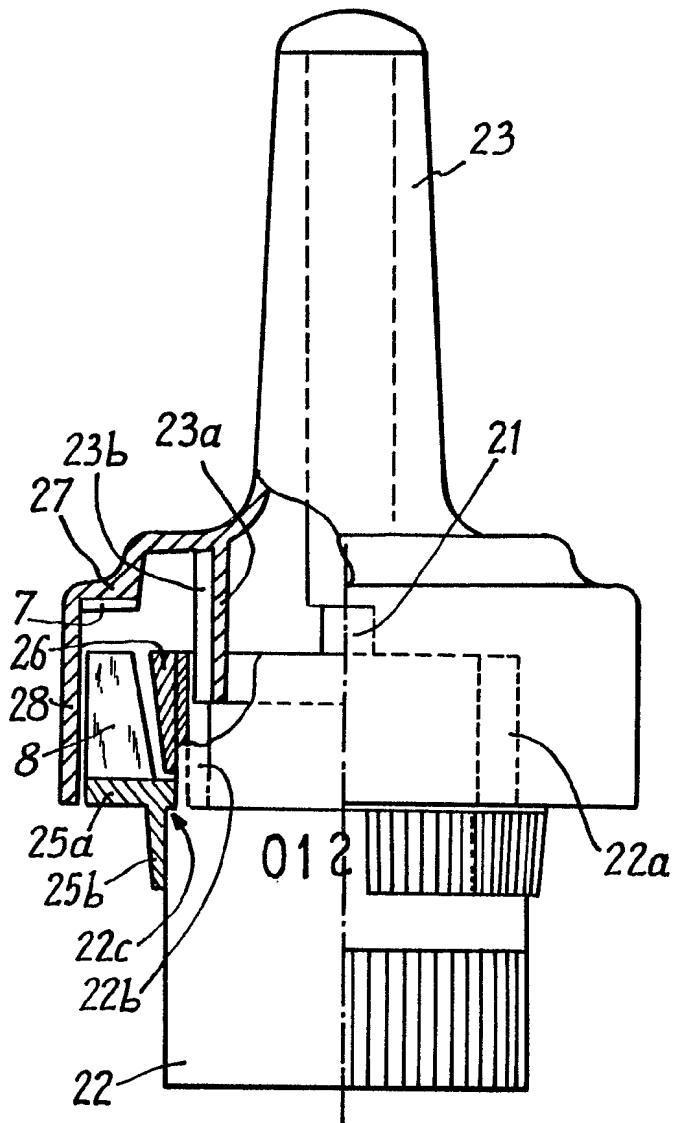
DOCUMENTS CONSIDERED AS PERTINENT			
Category	Citation of document with indication, if needed, of pertinent parts	Related Claim	APPLICATION CLASSIFICATION (Int. Cl.4)
X	EP-A-0 114 617 (E. PFEIFFER GmbH & CO. KG) * Figures: page 6, line 1 - page 7, line 29 *	1, 2, 7, 8	G 01 F 15/06 G 06 M 3/00 G 05 B 11/00 A 61 J 7/00
X	US-A-2 357 940 (M.A. DU LUDE) * Figures *	1, 2, 3, 7, 8 9, 10	
A	GP-A-2 037 045 (HARDINGS LTD) * Abstract; figures *	1	
A	FR-A-2 400 693 (LYALL) * Figures: page 5, line 37 - page 6, line 2 *	3	
A	DE-A-2 033 596 (NEUHIERL) * Figures *	1	
The present report was established for all claims			SEARCHED TECHNICAL DOMAINS (INT. CL.4)
			G 01 F G 06 M G 05 B
Place of research LA HAYE		Research completed date March 09, 1988	Examiner NUIJTEN E.M.
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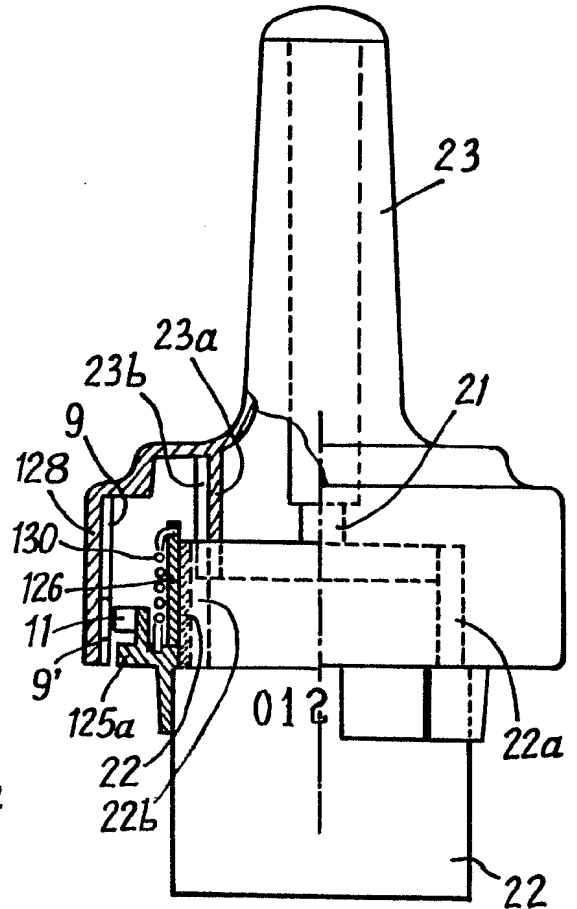


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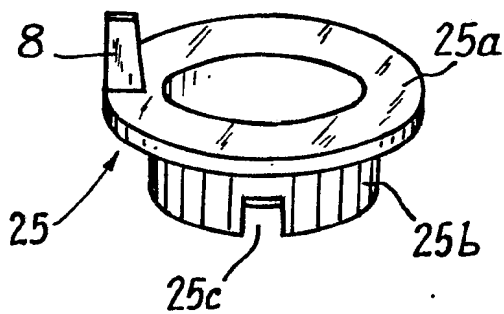
**Fig: 7**



**Fig: 9**



**Fig: 8**



**Fig: 10**

